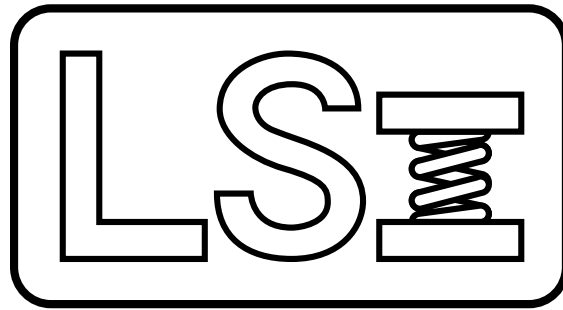


Larson Systems Inc.



DSUL / SUL / TUL User Manual

DSUL- Digital Squareness Under Load,

SUL - Squareness Under Load

TUL - Twist Under Load



Larson Systems Inc.

Digital Squareness Under Load, Squareness Under Load & Twist Under Load User Manual

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SUL - Squareness Under Load



1.0 Introduction

Larson Systems Inc. has created a solution for measuring the squareness of a spring, with ground ends, while in the loaded condition. The Larson Squareness Under Load System, is a system that allows the user to measure the composite angle of a compressed spring in degrees.

2.0 Description

The DSUL and SUL are intended for usage on up to 2.5" diameter OD. springs with a load of less than 1,500 lbs. It measures the composite angle in degrees with graduation of .1 degrees with a maximum of 15 degrees.

3.0 Installation

3.1 Mounting a DSUL or SUL on a Hand Tester

Mounting a DSUL or SUL to the lower platform requires a 5/16-18 hole, if your tester does not have the proper hole contact Larson Systems. When mounting the SUL on a hand tester, simply place the unit on the lower platform of tester with the front of the unit facing a direction that allows it to be easily read by the operator and does not interfere with the operation of the tester. Using a 3/16 Allen wrench, tighten the screw into the lower platform of tester.

If the upper platform is greater than 2.5" in diameter it must be removed/replaced, or a platform adapter must be used that does not exceed 2.5" in diameter.

3.2 Centering a DSUL or SUL on a Hand Tester

Centering the DSUL or SUL is very important to ensure proper test results.

With the unit mounted to the lower platform. Insert the centering pin into the platform of the unit. Lower the upper platform, if the center pin does not go into the platform the centering needs to be adjusted. With a allen wrench loosen the three screws that hold the platform on. Bring the platform down and move the platform until the centering pin goes into the platform. Once the centering pin goes into the platform bring the platform down top the unit and tighten the three screws.

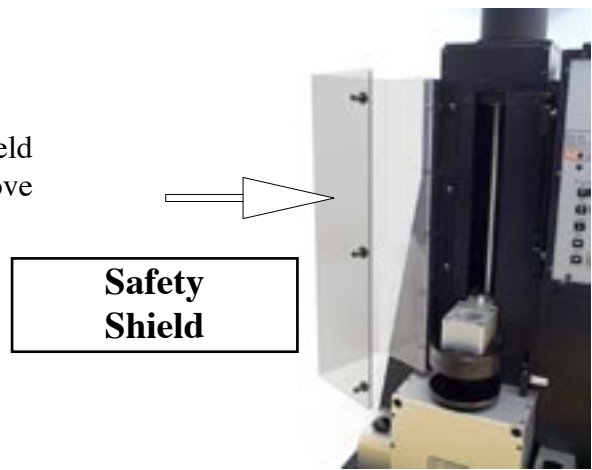


**Centering
Pin**

3.3 Mounting a DSUL or SUL on a UT Tester

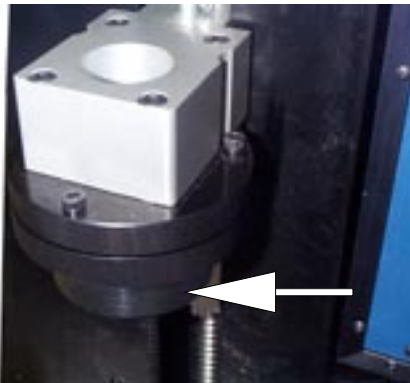
3.3.1 Removing the Safety Shield

If your UT 11 or UT 24 is equipped with the 3 sided safety shield you will have to remove it. Using a 1/8" Allen Wrench remove the four screws that hold the shield in place.

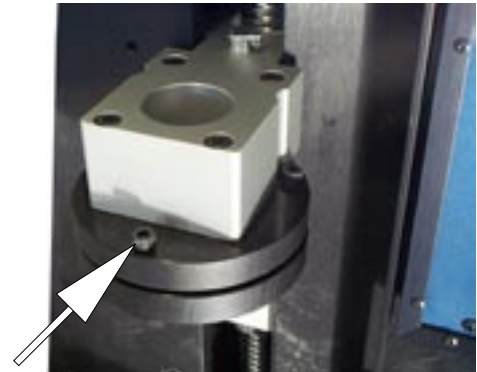


3.3.2 Replacing the Upper platform

The upper platform of the UT 11 and UT 24 is over 2.5" Dia. so it needs to be replaced. To remove the upper platform simply remove the three cap screws with a 5/32" Allen Wrench.

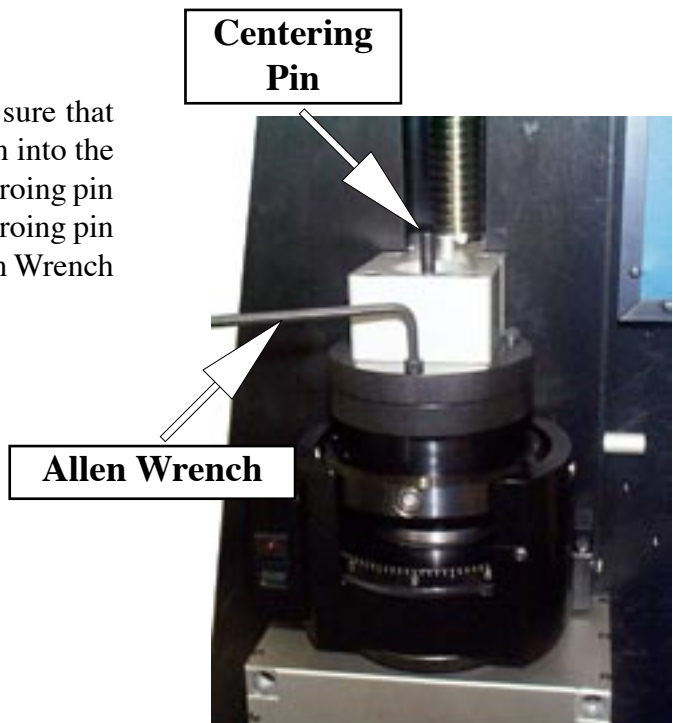


Using the three cap screws mount the replacement platform included with your SUL. Leave the platform loose so it can be centered in the next step.



3.4 Centering the Upper Platform

Lower the upper platform so it touches the unit, make sure that you can slide the platform around. Insert the zeroing pin into the top of the platform. Slide the platform around until the zeroing pin goes into the hole in the platform of the unit. Once the zeroing pin is in place tighten the three cap screws with a 5/32" Allen Wrench and remove the zeroing pin.



3.5 Precision Alignment

3.5.1 Verify parallelism between the lower platform and the 2.5" Ø adapter

3.5.1.1 Mount the 2.5" Ø adapter to the upper platform.

3.5.1.2 Place an indicator and stand on the lower platform and bring the upper platform down to the indicator.

3.5.1.3 Rotate the indicator around the lower platform at 90° intervals (a mirror may be helpful).

NOTE: The indicator readings must be within 0.001" TIR.



3.5.2 Mount the DSUL onto the lower platform

3.5.2.1 Mount the DSUL base plate onto the lower platform with either a 5/8-18 or 5/16-18 SHCS (socket head cap screw).

3.5.2.2 Mount the DSUL onto the base plate using two 5/16 hex bolts and washers. Tighten lightly.



3.5.3 Mount the centering gage and pin

3.5.3.1 Place the centering gage onto the DSUL. Press a 3/8" dowel pin through inside center hole and into the DSUL top plate to locate it.

3.5.3.2 Screw the centering pin to the center mounting hole of the upper platform.



3.5.4 Align the DSUL with the centering pin in the upper platform

3.5.4.1 Lower the upper platform carefully to ensure it is flush with the centering gage, then load it to 10 lb of force.

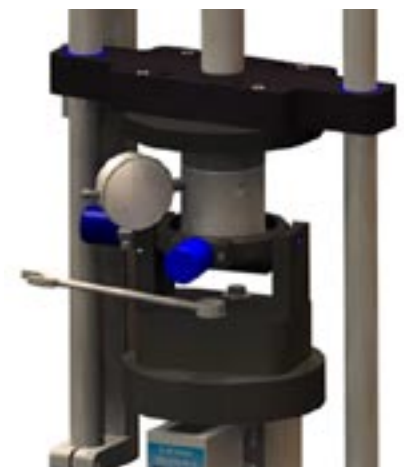
3.5.4.2 Loosen the 5/16" hex bolts slightly with a 1/2" wrench.

3.5.4.3 Place the indicator in one of the counter-bored holes in the centering gage, then set the indicator to zero.

3.5.4.4 Place the indicator in the opposite counter-bored hole.
NOTE: The indicator readings must be within 0.002" TIR.

3.5.4.5 If the indicator reading is not within 0.002" TIR, move the DSUL until it is.

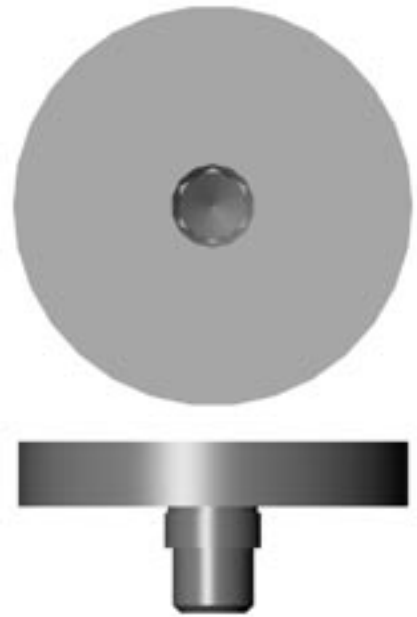
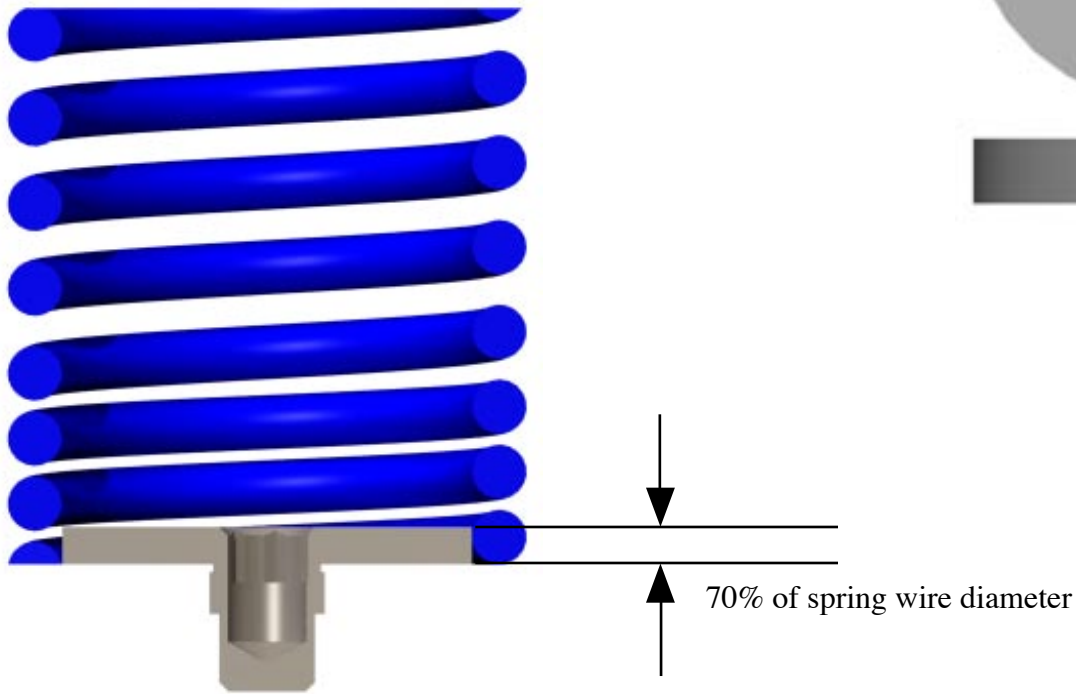
3.5.4.6 Tighten the 5/16 hex bolts. Recheck the alignment with the indicator.



3.6 Centering Pilot Design

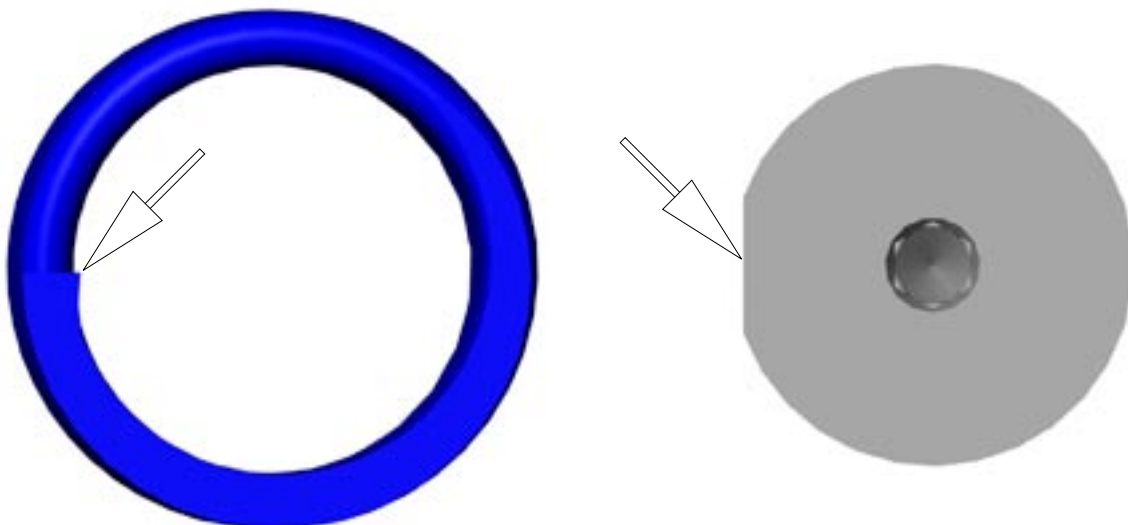
3.6.1 Custom fit the centering pilot to the spring

- The outside diameter of the pilot should be within 0.002" of the inside diameter of the spring.
- The height of the pilot should be 70% of the spring wire diameter.



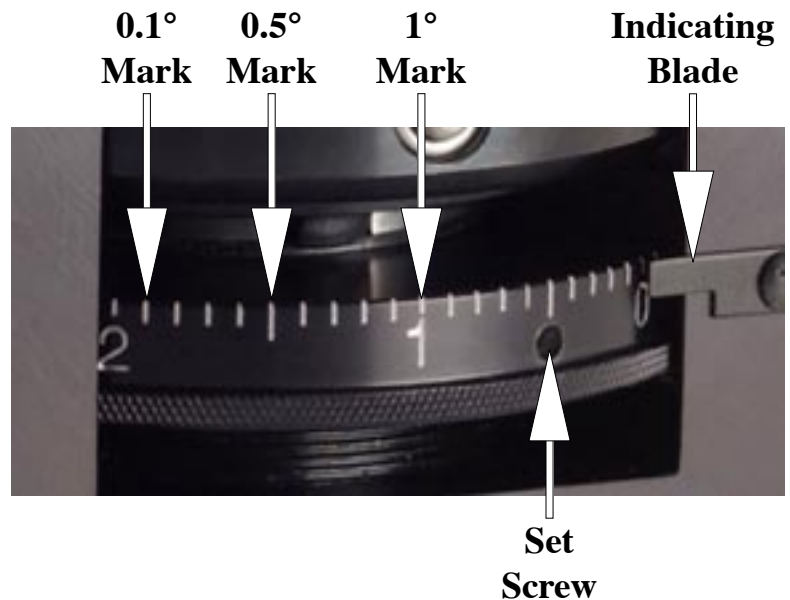
3.6.2 Allow for spring burr

- If deburring of the spring is not a part of the process, then grind a small relief in the side of the centering pilot.



4.0 Reading the SUL

The SUL features an indicating dial that is graduated in .1 degrees and is numbered for full degrees, the half degree mark is slightly longer than the .1 degree marks for visibility. The SUL also features an LED Light. When you turn the Indicating Ring and the center makes contact the light will turn on. The reading is taken at the indicating blade, when the light turns. It is important that the operator is directly in front of the unit, this will ensure the best possible readings.



5.0 Using the SUL on a Hand Tester

After installation, you will have to prepare for the testing. You will need to zero the length and the force of the tester. You will have to also chose a centering pilot to properly center the spring during testing. LSI recommends that the centering pilot is just smaller than the ID of the spring. If there is not a centering pilot that will work for your application contact LSI for a solution.

5.1 Zeroing the length

With the force zeroed lower the upper platform so it makes contact with the SUL platform. Apply a load equal to approximately to 20% of full scale. Once you have the load applied zero the length.



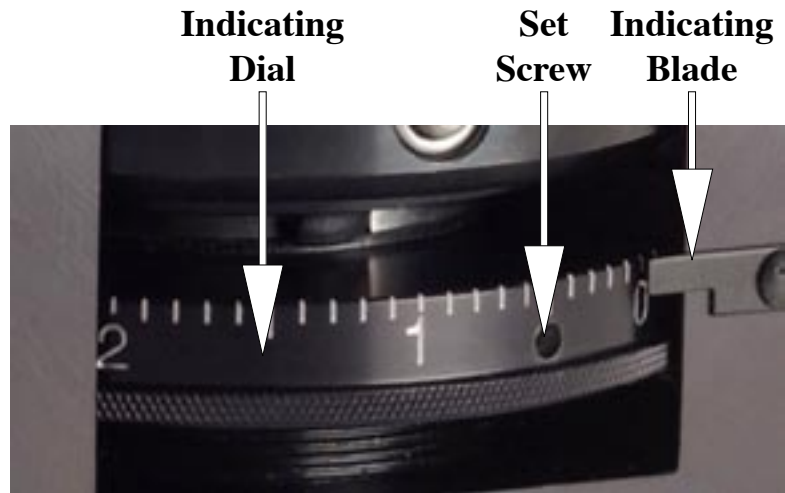
5.2 Centering pilots

Centering of the spring is very important to ensure good test results. Select a centering pilot that will work for your spring and install on both the upper and lower platforms.



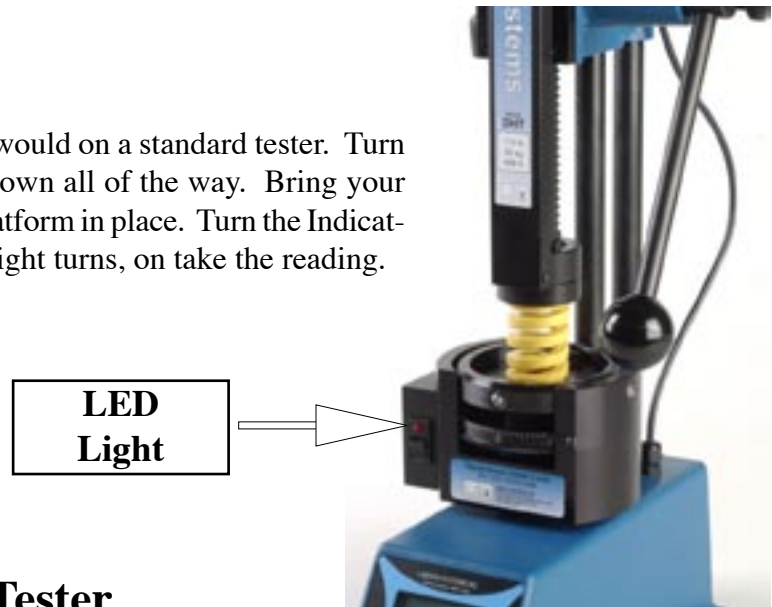
5.3 Zeroing the SUL

The Indicating dial may need to be adjusted. Bring the upper platform down and apply a load the SUL. Rotate the Indicating Dial so it is tight. If the dial is not reading zero with a .050 Allen Wrench loosen the set screw and rotate the dial to the zero reading, tighten the set screw.



5.4 Testing with the SUL

You will preform tests in the same way that you would on a standard tester. Turn the LED Light on, and turn the Indicating dial down all of the way. Bring your spring down to the required height and lock the platform in place. Turn the Indicating Dial until the LED light turns on; when the light turns, on take the reading.



6.0 Using the SUL on a UT Tester

After installation, you will have to prepare for the testing. You will need to zero the length and the force of the tester. You will have to also chose a centering pilot to properly center the spring during testing. LSI recommends that the centering pilot is just smaller than the ID of the spring. If there is not a centering pilot that will work for your application, contact LSI for a solution.

6.1 Initializing the UT Tester

With the SUL installed on the UT you can initialize the tester. Press the green Start Test button on the UT, this will bring the upper platform down and zero the length and force.

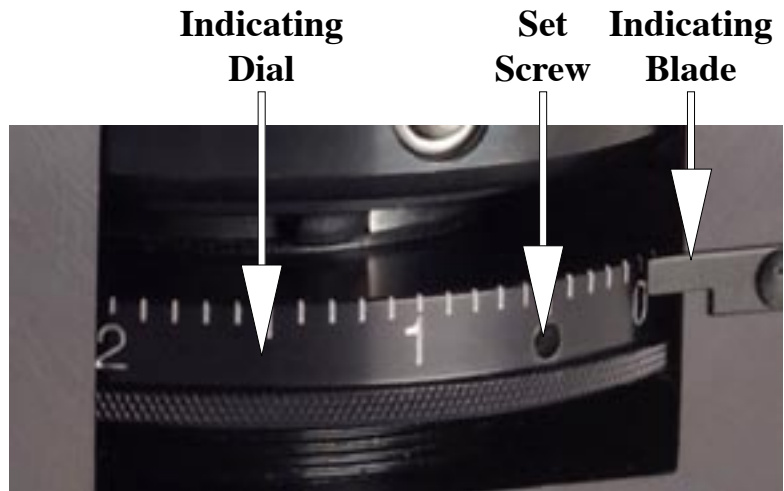
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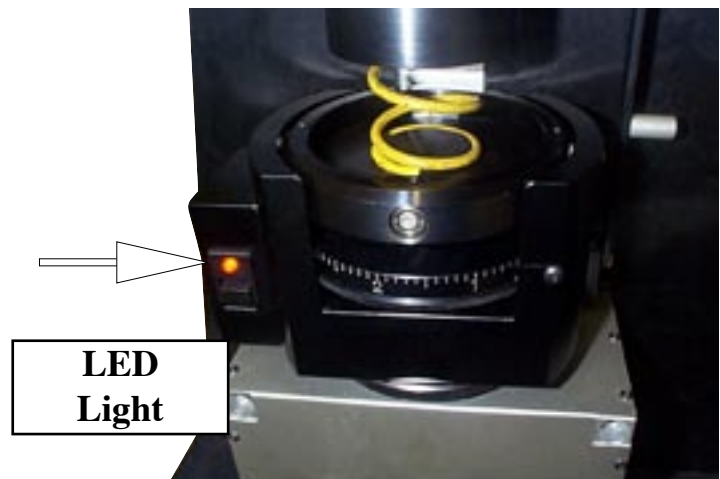
6.3 Zeroing the SUL

The Indicating dial may need to be adjusted. Bring the upper platform down and apply a load the SUL. Rotate the Indicating Dial so it is tight. If the dial is not reading zero with a .050 Allen Wrench loosen the set screw and rotate the dial to the zero reading, tighten the set screw.



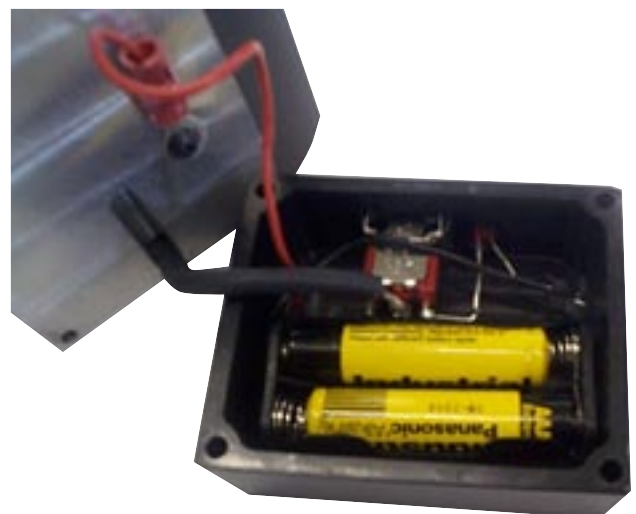
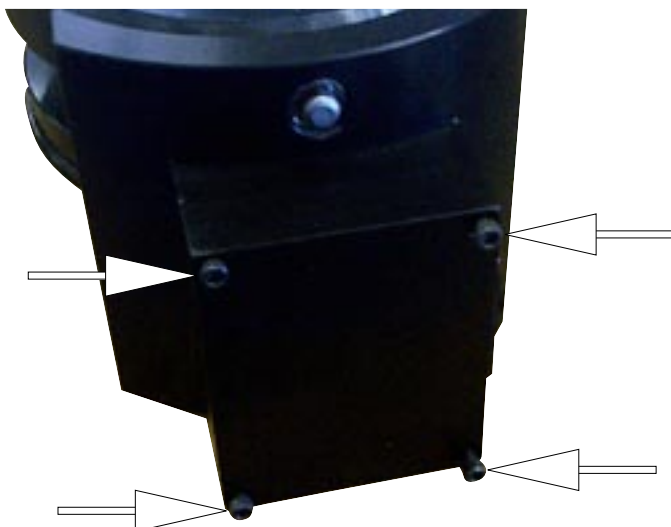
6.4 Testing with the SUL

You will preform tests in the same way that you would on a standard tester except the pause feature on the UT is required. When you program your test you will need to add a pause after the test point. Turn the LED Light on and turn the Indicating dial down all of the way. Load the spring and press the Start Test Button. When the tester is paused turn the Indicating Dial until the LED light turns on, when the light turns on you will take you reading.



7.0 Replacing the Batteries in your SUL

Your SUL is powered with two AAA 1.5 volt batteries. To replace the batteries remove the four cap screws with a 3/32" Allen Wrench this will open the side cover. Carefully remove the batteries and reinstall new ones.



8.0 Basic Operation of the DSUL

The DSUL is very easy to use. To turn power on press the On/ Clear button. To turn power off press the Option button until you see power displayed then press F2 button. Pressing the Zero Angle will zero all of the angle readings. Pressing Units will change the way the units are displayed. Pressing Store will send the test data to the memory. Pressing Send will send the test data to a printer if one is hooked up.



9.0 Using a DSUL on a Hand Tester

After installation, you will have to prepare for the testing. You will need to zero the length and the force of the tester. You will have to also chose a centering pilot to properly center the spring during testing. LSI recommends that the centering pilot is just smaller than the ID of the spring. If there is not a centering pilot that will work for your application contact LSI for a solution.

9.1 Zeroing the DSUL

With the force zeroed lower the upper platform so it makes contact with the DSUL platform. Apply a load equal to approximately to 20% of full scale. Once you have the load applied press the Zero Angle button on the DSUL. Also with the load applied press the zero length button on the hand tester.





9.2 Centering Pilots

Centering of the spring is very important to ensure good test results. Select a centering pilot that will work for your spring and install on both the upper and lower platforms.

9.3 Testing with the DSUL

You will preform tests in the same way that you would on a standard tester. When you bring the spring down to the required height and lock the platform in place. Once the platform is locked in place you may take down the Z angle reading or press send if a printer is hooked up to your



10.0 Using the DSUL on a UT Tester

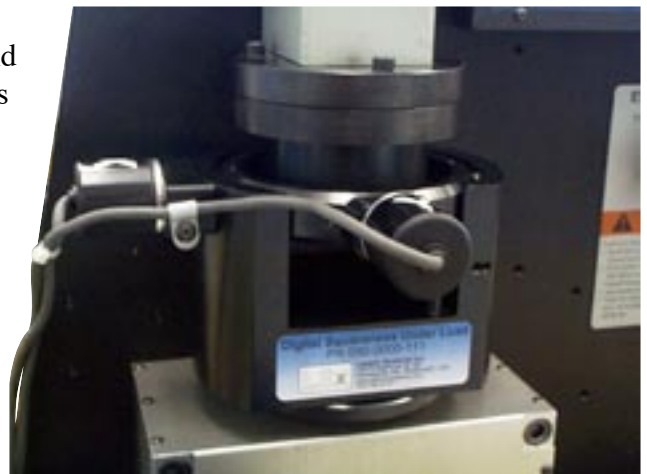
After installation, you will have to prepare for the testing. You will need to zero the length and the force of the tester. You will have to also chose a centering pilot to properly center the spring during testing. LSI recommends that the centering pilot is just smaller than the ID of the spring. If there is not a centering pilot that will work for your application, contact LSI for a solution.

10.1 Initializing the UT Tester

With the DSUL installed on the UT you can initialize the tester. Press the green Start Test button on the UT, this will bring the upper platform down and zero the length and force.

10.2 Zeroing the DSUL

To zero the DSUL lower the upper platform of the tester and apply a load of about 20% of full scale. Once the load is applied press the Zero Angle button on the DSUL.





10.3 Centering Pilots

Centering of the spring is very important to ensure good test results. Select a centering pilot that will work for your spring and install on both the upper and lower platforms.

10.4 Testing with the DSUL

You will preform tests in the same way that you would on a standard tester except the pause feature on the UT is required. When you program your test you will need to add a pause after the test point. Load the spring and press the Start Test Button. When the tester is paused you can take your Z angle reading or if a printer is hooked up to your DSUL you can press the Send button to print.



TUL - Twist Under Load



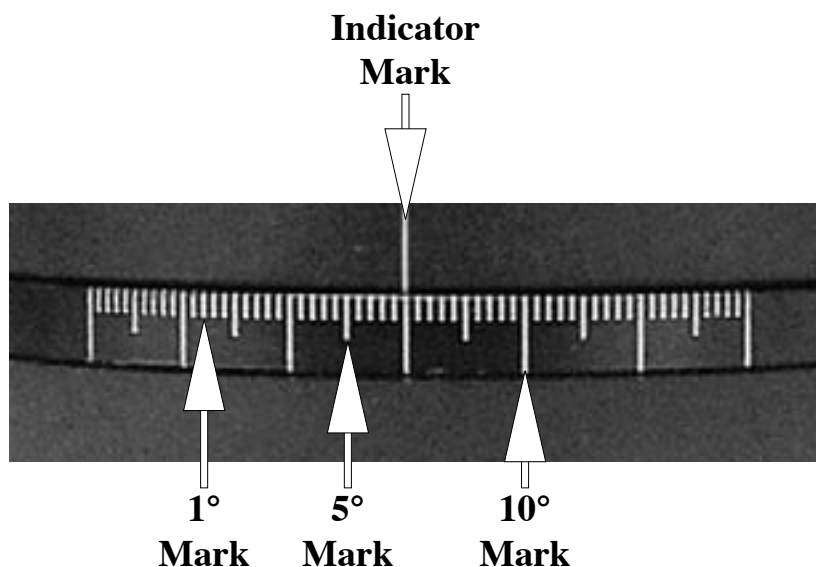
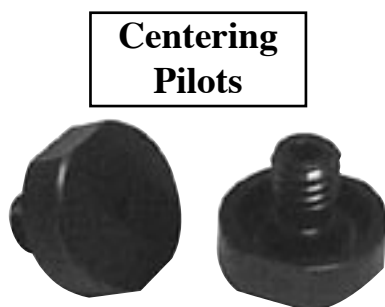
Installation

To install the TUL, simply place the unit on the lower platform with the indicating hash marks facing out and tighten the screw into the lower platform. Once installed make sure the TUL is able to twist freely.



Operation

Determine if the spring will twist clockwise or counterclockwise. If clockwise, line up the indicator mark on the right-most mark (B). If counterclockwise, line up the indicator mark on the left-most mark (A). This way all 60 degrees are available to be read. Select a spring centering pilot that has a snug fit in the spring. Load the spring and compress it to the desired length and count the number of marks that pass the indicator. Repeat as needed.

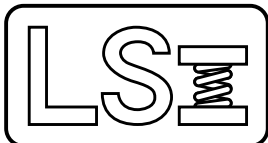


Larson UT considerations

In order to effectively use the TUL on a Larson UT you must have the software **Pause** option, this allows the tester to go to a desired length and pause while you take a reading on the unit.

Maintenance of your TUL

The TUL is a low maintenance device that will occasionally require the addition of a very light oil applied to the ball bearings. Too much oil or too heavy an oil will inhibit the operation of the TUL.



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